IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Tomoyuki KOGO

Application No.: 10/594,580 Examiner: T. TRIEU

Filed: September 27, 2006 Docket No.: 129354

For: EXHAUST GAS CONTROL APPARATUS AND EXHAUST GAS CONTROL METHOD FOR INTERNAL COMBUSTION ENGINE

BRIEF ON APPEAL

Appeal from Group 3748

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is Toyota Jidosha Kabushiki Kaisha, by way of an Assignment recorded in the U.S. Patent and Trademark Office beginning at Reel 018399, Frame 0506.

II. STATEMENT OF RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 10-18 are on appeal.

Claims 10-18 are pending.

Claims 10-18 are rejected.

Claims 1-9 are canceled.

IV. STATUS OF AMENDMENTS

An Amendment After Final Rejection was filed on September 13, 2010. By an Advisory Action dated September 30, 2010, it was indicated that the requested amendments had been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This disclosure relates to an exhaust gas control system where energy of the exhaust gas is efficiently used to filter the exhaust gas through a catalyst filter after the exhaust gas has passed through a supercharger. (Specification, page 1, lines 5-8; and page 4, lines 8-25). The system increases a temperature of the exhaust gas by performing after-injection to cause the exhaust gas to reach a temperature sufficient for the catalyst to effectively filter the exhaust gas. (Specification, page 11, lines 14-19). The system decreases the amount of the exhaust gas that is used to rotate a turbine of a supercharger if the system determines that the supercharger is causing the energy and temperature of the exhaust gas to decrease below a predetermined threshold sufficient for effective filtering. (Specification, page 4, lines 8-25). In particular, when a work amount of a supercharger compressor is increased due to the increased energy of the exhaust gas caused by the after-injection process, a turbine rotation controller decreases an amount of energy taken from the exhaust gas that is used for rotating the turbine until the system determines that the work amount of the supercharger compressor is at a level equal to that prior to performing the after-injection process. (*Id.*).

The invention of independent claim 10 recites the structure of the exhaust gas control apparatus, including the features discussed above that efficiently filter the exhaust gas while powering a supercharger. In particular, independent claim 10 recites: An exhaust gas control apparatus for an internal combustion engine (1; page 7, line 15; Fig. 1), comprising: a catalyst (17; page 8, lines 6-8; Fig. 1) which is provided in an exhaust passage (16; page 8, line 7; Fig. 1) of the internal combustion engine and which has an oxidizing ability; a supercharger (10; page 7, line 24; Fig. 1) which includes a turbine (10b; page 8, line 3; Fig. 1) that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor (10a; page 7, line 24; Fig. 1) that is rotated in accordance with rotation of the turbine and that performs supercharging; a turbine rotation controller (26, 10c and 21-23;

page 9, line 27 - page 10, line 2; page 10, lines 5-7; page 14, lines 1-6 and 15-20; page 14, line 21- page 17, line 24; Fig. 1); that adjusts an amount of energy of the exhaust gas, which is used for rotating the turbine; and an injection controller (26 and 3; page 10, lines 8-17; page 11, lines 14-19 and lines 25-32; Fig. 1) that performs after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst, wherein when a work amount of the compressor is increased due to the after-injection performed by the injection controller, the turbine rotation controller decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero (S105-S109; page 15, line 18 - page 17, line 24; Fig. 2B).

The invention of dependent claim 13 recites: The exhaust gas control apparatus according to claim 10, wherein at least one of an intake air amount detector (9; page 7, line 25; Fig. 1) that detects an amount of intake air flowing through an intake passage (7; page 7, line 20; Fig. 1) of the internal combustion engine and an intake air pressure detector (14; page 7, lines 29-32; Fig. 1) that detects a pressure of the intake air is further provided in the intake passage of the internal combustion engine, and wherein the turbine rotation controller decreases the amount of energy of the exhaust gas, which is used for rotating the turbine, when a value detected by the intake air amount detector or the intake air pressure detector after the after-injection is performed is higher than a value detected by the intake air amount detector or the intake air pressure detector before the after-injection is performed (S105-S107; page 15, line 18 - page 17, line 24; Fig. 2B).

The invention of independent claim 14 recites an exhaust gas control method for efficiently filtering the exhaust gas while powering a supercharger. In particular, independent claim 14 recites: An exhaust gas control method for an internal combustion engine (1; page 7, line 15; Fig. 1) including a catalyst (17; page 8, lines 6-8; Fig. 1) which is provided in an

exhaust passage (16; page 8, line 7; Fig. 1) of the internal combustion engine and which has an oxidizing ability; a supercharger (10; page 7, line 24; Fig. 1) which includes a turbine (10b; page 8, line 3; Fig. 1) that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor (10a; page 7, line 24; Fig. 1) that is rotated in accordance with rotation of the turbine and that performs supercharging; a turbine rotation controller (26, 10c and 21-23; page 9, line 27 - page 10, line 2; page 10, lines 5-7; page 14, lines 1-6 and 15-20; page 14, line 21 - page 17, line 24; Fig. 1) that adjusts an amount of energy of the exhaust gas, which is used for rotating the turbine; an injection controller (26 and 3; page 10, lines 8-17; page 11, lines 14-19 and 25-32; Fig. 1) that performs after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst, the method comprising: decreasing an amount of energy taken from the exhaust gas for rotating the turbine when a work amount of the compressor is increased due to the after-injection performed by the injection controller in order to decrease the increase in the work amount due to the after injection to zero (S105-S109; page 15, line 18 - page 17, line 24; Fig. 2B).

The invention of dependent claim 17 recites: The exhaust gas control method according to claim 14, further comprising: detecting at least one of an amount of intake air flowing through an intake passage (7; page 7, line 20; Fig. 1) of the internal combustion engine via an intake air amount detector (9; page 7, line 25; Fig. 1) and detecting a pressure of the intake air in the intake passage of the internal combustion engine via an intake air pressure detector (14; page 7, lines 29-32; Fig. 1), and decreasing the amount of energy of the exhaust gas, which is used for rotating the turbine, when a value detected by the intake air amount detector or the intake air pressure detector after the after-injection is performed is higher than a value detected by the intake air amount detector or the intake air pressure

detector before the after-injection is performed (S105-S107; page 15, line 18 - page 17, line 24; Fig. 2B).

The invention of independent claim 18 recites the structure of the exhaust gas control apparatus, including the features discussed above that efficiently filter the exhaust gas while powering a supercharger. In particular, independent claim 18 recites: An exhaust gas control apparatus for an internal combustion engine (1; page 7, line 15; Fig. 1), comprising: a catalyst (17; page 8, lines 6-8; Fig. 1) which is provided in an exhaust passage (16; page 8, line 7; Fig. 1) of the internal combustion engine and which has an oxidizing ability; a supercharger (10; page 7, line 24; Fig. 1) which includes a turbine (10b; page 8, line 3; Fig. 1) that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor (10a; page 7, line 24; Fig. 1) that is rotated in accordance with rotation of the turbine and that performs supercharging; turbine rotation energy amount adjusting means (26, 10c and 21-23; page 9, line 27 - page 10, line 2; page 10, lines 5-7; page 14, lines 1-6 and 15-20; page 14, line 21 - page 17, line 24; Fig. 1) for adjusting an amount of energy of the exhaust gas, which is used for rotating the turbine; and after-injection performing means (26 and 3; page 10, lines 8-17; page 11, lines 14-19 and 25-32; Fig 1) for performing after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst, wherein when a work amount of the compressor is increased due to the after-injection performed by the after-injection performing means, the turbine rotation energy amount adjusting means decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero (S105-S109; page 15, line 18 - page 17, line 24). The turbine rotation energy amount adjusting means is a means-plus-function (MPF) recitation, and its corresponding structure is the ECU 26; the nozzle vane actuator 10c and the bypass passage 21 with its wastegate valve 22 and wastegate

valve actuator 23. The after-injection performing means is the ECU 26 and the fuel injection valve 3.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection is presented for review:

(1) claims 10-18 are rejected under 35 U.S.C. §112, second paragraph;

(2) claims 10-12, 14-16 and 18 are rejected under 35 U.S.C. §103(a) over Saito et al., JP-A-2003-206722;

(3) claims 10-12, 14-16 and 18 are rejected under 35 U.S.C. §103(a) over Saito in view of either Kobayashi et al., JP-A-2003-278536, or Nagae, JP-A-2002-070536; and

(4) claims 13 and 17 are rejected under 35 U.S.C. §103(a) over Saito in view of Kobayashi or Nagae and further in view of Kawamoto, JP-A-2003-120353.

VII. ARGUMENT

A. Claims 10-18 Comply With The Requirements Of 35 U.S.C. §112, Second Paragraph

The July 13, 2010 Final Rejection (hereinafter "Office Action") alleges that claims 10-18 are "incomplete for omitting essential elements, such omission amounting to a gap between the elements," citing MPEP §2172.01. The Office Action specifically asserts that structural connectivity of a controller unit and sensors with the engine system are omitted. (Office Action, pages 2, 3 and 13-15). However, neither the specification nor any other statement of record defines the structural connectivity of the controller unit and the sensors as being "essential."

According to the MPEP, "[A] claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph, for failure to point out and distinctly claim the invention." (MPEP §2172.01). The specification does not define the allegedly omitted features as being "essential." Thus, the allegedly omitted features are not essential and the claims are not indefinite.

Additionally, "it is not essential to a patentable combination that there be interdependency between the elements of the claimed device or that all the elements operate concurrently toward the desired result." (MPEP §2172.01, *citing Ex parte Nolden*, 149 USPQ 378, 380 (Bd. Pat. App. 1965)). "A claim does not necessarily fail to comply with 35 U.S.C. 112, second paragraph where the various elements do not function simultaneously, are not directly functionally related, do not directly intercooperate, and/or serve independent purposes." (*Id.*, *citing Ex parte Huber*, 148 USPQ 447, 448-49 (Bd. Pat. App. 1965)). Although the Office Action asserts that the structural connectivity between the controller and the sensors is essential, the above case law holds that such structural relationships are not

essential and need not be recited in the claims. Thus, Appellant submits that claims 10-18 are definite.

Furthermore, independent claim 18 recites a "turbine rotation energy amount adjusting means" and an "after-injection performing means" in means-plus-function format, and thus are construed to read on the disclosed structure that performs the recited functions. Thus, claim 18 implicitly recites the structure necessary to perform the recited functions and should not be included in this rejection.

Withdrawal of the rejection of claims 10-18 is requested.

B. Independent Claims 10, 14 and 18 Are Patentable Over Saito

Saito fails to disclose and would not have rendered obvious "a supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst," as recited in independent claims 10, 14 and 18.

The Office Action admits that Saito "fails to disclose the position of the turbine being provided in the exhaust passage at a position upstream of the catalyst having an oxidizing ability, or the position of the catalyst having an oxidizing ability and being provided in the exhaust passage at a position downstream of turbine." (Office Action, page 5). To remedy this deficiency, the Office Action asserts that "the positioning of the turbine being in the exhaust passage at a position upstream of the catalyst having an oxidizing ability, or the positioning of the catalyst having an oxidizing ability and being provided in the exhaust passage at a position downstream of the turbine in the above claimed positions would have been obvious to one having ordinary skill in the art." (Office Action, page 6). The Office Action provides no support for this conclusory assertion other than alleging that "the arrangement of these devices would have reduced exhaust emissions." (*Id.*). Yet, none of the applied references (including Saito) suggests that moving Saito's catalyst to upstream of

Saito's turbine would reduce emissions. There is no factual basis for the allegation in the Office Action that the arrangement of these devices would have reduced exhaust emissions.

Indeed, Saito discloses an advantage of its disclosed location of the catalyst (upstream of the supercharger), and modifying the location of the catalyst would render the system in Saito unsatisfactory for its intended purpose. (MPEP §2143.01(V)). That is, Saito discloses that the hot exhaust gas from the engine heats the filter 21. (Saito, paragraphs [0043] and [0044]). The exhaust gas is heated in a post-injection process by the combustion of CO and HC in a catalytic reaction at the catalyst. (*Id.*). The above process increases the temperature of the exhaust gas, which increases the work of the turbine 20, causing an increase in air flow which, in turn, avoids overheating and breaking the filter 21. (*Id.*). When the location of the catalyst is switched (as the Office Action proposes), the Saito system would not function properly because the turbine 20 would not be located downstream of the filter 21 so as to receive excess thermal energy from the filter 21, and thus would not increase the air flow so as to avoid overheating of the filter 21. Therefore, one of ordinary skill would not have been led to change the location of the catalyst (as proposed by the Office Action) because doing so would render the system in Saito unsatisfactory for its intended purpose. (MPEP §2143.01(V)).

As acknowledged by the Office Action, Saito fails to specifically disclose "a supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst," as recited in independent claims 10, 14 and 18. Further, there is no basis for modifying the structure of Saito to include the above feature, as shown by the lack of evidence supporting the Office Action's assertion. Indeed, the specific teachings of Saito provide an advantage for its disclosed location of the catalyst, and would not have motivated one of ordinary skill to eliminate this advantage by moving the catalyst location. The PTO has thus failed to establish a *prima facie* case of obviousness with respect to the feature "a

supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst," as recited in independent claims 10, 14 and 18 (emphasis added).

Saito also fails to disclose and would not have rendered obvious "wherein when a work amount of the compressor is increased due to the after-injection performed by the injection controller, the turbine rotation controller decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero," as recited in independent claim 10; "decreasing an amount of energy taken from the exhaust gas for rotating the turbine when a work amount of the compressor is increased due to the after-injection performed by the injection controller in order to decrease the increase in the work amount due to the after injection to zero," as recited in independent claim 14; and "wherein when a work amount of the compressor is increased due to the after-injection performed by the after-injection performing means, the turbine rotation energy amount adjusting means decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero," as recited in independent claim 18.

The Office Action asserts that Fig. 1 and paragraphs [0029], [0031], [0043], [0044] and [0046] of Saito disclose the above features. (*See e.g.* Office Action, page 5). However, paragraphs [0029] and [0031] of Saito merely relate to a post-injection process that increases the temperature of the exhaust gas. Paragraphs [0043], [0044] and [0046] explain that this post-injection process achieves increased boost pressure from the supercharger to carry away excess heat from the filter and control overheating or breakage of the filter. In other words, the post-injection process of Saito increases the work amount of the compressor. In contrast, independent claims 10, 14 and 18 maintain the work amount of the compressor, i.e., "decrease the increase in the work amount due to the after injection to zero." Saito thus fails

to disclose and would not have rendered obvious the above features of independent claims 10, 14 and 18.

C. Independent Claims 10, 14 and 18 Are Patentable Over The Combination Of Saito in view of Kobayashi or Nagae

The Office Action applies Saito in combination with Kobayashi or Nagae in a similar manner as discussed above with respect to the §103(a) rejection over Saito alone. Thus, the arguments provided in Section B of this Appeal Brief are also applicable to this rejection. In particular, moving the catalyst of Saito to a position downstream of the supercharger turbine goes against the teachings of Saito and would not have been obvious.

In addition, Saito and Kobayashi/Nagae would not have been obvious to combine and the PTO has failed to establish any reasoning for such a combination. In justifying the combination of references, the Office Action alleges that the combination of Saito and Kobayashi/Nagae would have been obvious to one having ordinary skill in the art "to prevent/solve a clogging/accumulating of particulate matter or soot when the exhaust gas is to be discharged to the atmosphere." (Office Action, page 9). In the alternative, the Office Action alleges that the combination "would have yielded predictable results, namely, to prevent/solve a clogging/accumulating of particulate matter or soot when the exhaust gas is to be discharged to the atmosphere." (Office Action, page 10). The Office Action again provides no factual basis for these arguments.

Also, as discussed in the present specification, arranging a supercharger turbine and catalyst as claimed overcomes technical difficulties that are neither disclosed nor addressed in the applied references. As discussed in the present specification,

> [in an] internal combustion engine including a centrifugal supercharger, even when the temperature of the exhaust gas released from the internal combustion engine is increased, the energy of the exhaust gas is used for increasing a rotational speed of a turbine. Accordingly, the temperature of the exhaust gas flowing from the NOx catalyst cannot be increased

> sufficiently. Also, as the energy of the exhaust gas is used for increasing the rotational speed of the turbine and therefore the rotational speed of the turbine increases, a rotational speed of a compressor also increases and an amount of air taken in a cylinder increases. Accordingly, the intake air amount needs to be adjusted by decreasing an opening amount of an intake throttle valve. As a result, a pumping loss of the internal combustion engine increases, which causes deterioration of fuel efficiency. (Specification, page 2, line 28 - page 3, line 4).

As noted in the specification, the prior art fails to recognize this problem: "In order to address this problem, a technology is proposed, in which a variable nozzle provided in the centrifugal supercharger or a wastegate valve is fully open such that the energy of the exhaust gas is prevented from being used for increasing the rotational speed of the turbine." (Specification, page 3, lines 5-8). With this solution to the problems of the prior art, "an amount of energy of the exhaust gas, which is used for increasing the rotational speed of the turbine, decreases. As a result, the intake air amount becomes smaller than that before the variable nozzle or wastegate valve is fully opened, which may cause an increase in amount of smoke." (Specification, page 3, lines 12-15).

None of the applied references recognizes this problem or proposes a solution to this problem. That is, Appellant discovered the source of the problem solved by the claimed invention. This is part of the "subject matter as a whole" that must be considered by the Examiner. *See* MPEP §2141.02(III) and (IV). Thus, the combination of claimed features would not have been obvious from the applied references as alleged in the Office Action.

D. Claims 13 and 17 Are Patentable Over Saito in view of Kobayashi or Nagae and further in view of Kawamoto

Claim 13 recites "the turbine rotation controller decreases the amount of energy of the exhaust gas ... when a value detected by the intake air amount detector or the intake air pressure detector after the after-injection is performed is higher than a value detected by the intake air amount detector or the intake air pressure detector before the after-injection is

performed." In rejecting claim 13, the Office Action alleges that paragraph [0030] of Kawamoto discloses these features.

In the cited portion of Kawamoto, "after-injection" is adjusted based on the boost pressure, i.e., a pressure obtained by supercharging. In contrast, claim 13 recites that the turbine rotation controller decreases the amount of energy of the exhaust gas flowing to the turbine of the supercharger itself if the amount or pressure of the exhaust gas is above a predetermined threshold value. In other words, claims 13 and 17 recite a process by which air entering the supercharger is adjusted, whereas the cited references disclose a process by which air exiting the supercharger is analyzed to adjust an amount of after-injection. Thus, Kawamoto fails to disclose the features of claim 13 as alleged in the Office Action, and the Office Action fails to provide reasoning why these features would have been obvious. Claim 17 recites similar features and is patentable over the applied art for similar reasons.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 10-18 are in condition for allowance. For all of the above reasons, Appellant respectfully requests this Honorable Board to reverse the rejections of claims 10-18.

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APPENDIX A - CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

10. An exhaust gas control apparatus for an internal combustion engine, comprising:

a catalyst which is provided in an exhaust passage of the internal combustion engine and which has an oxidizing ability;

a supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor that is rotated in accordance with rotation of the turbine and that performs supercharging;

a turbine rotation controller that adjusts an amount of energy of the exhaust gas, which is used for rotating the turbine; and

an injection controller that performs after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst,

wherein when a work amount of the compressor is increased due to the after-injection performed by the injection controller, the turbine rotation controller decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero.

11. The exhaust gas control apparatus according to claim 10, wherein the turbine rotation controller decreases the amount of energy of the exhaust gas, which is used for rotating the turbine, by increasing an opening amount of a variable nozzle provided in the supercharger and/or an opening amount of a wastegate valve.

12. The exhaust gas control apparatus according to claim 11, wherein the injection controller decides an amount of fuel injected by the after-injection based on a temperature at which the catalyst is activated, and

wherein the turbine rotation controller increases the opening amount of the variable nozzle provided in the supercharger and/or the opening amount of the wastegate valve as the amount of fuel injected by the after-injection increases.

13. The exhaust gas control apparatus according to claim 10, wherein at least one of an intake air amount detector that detects an amount of intake air flowing through an intake passage of the internal combustion engine and an intake air pressure detector that detects a pressure of the intake air is further provided in the intake passage of the internal combustion engine, and

wherein the turbine rotation controller decreases the amount of energy of the exhaust gas, which is used for rotating the turbine, when a value detected by the intake air amount detector or the intake air pressure detector after the after-injection is performed is higher than a value detected by the intake air amount detector or the intake air pressure detector before the after-injection is performed.

14. An exhaust gas control method for an internal combustion engine including a catalyst which is provided in an exhaust passage of the internal combustion engine and which has an oxidizing ability; a supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor that is rotated in accordance with rotation of the turbine and that performs supercharging; a turbine rotation controller that adjusts an amount of energy of the exhaust gas, which is used for rotating the turbine; an injection controller that performs after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst, the method comprising:

decreasing an amount of energy taken from the exhaust gas for rotating the turbine when a work amount of the compressor is increased due to the after-injection

performed by the injection controller in order to decrease the increase in the work amount due to the after injection to zero.

15. The exhaust gas control method according to claim 14, further comprising increasing at least one of an opening amount of a variable nozzle provided in the supercharger and an opening amount of a wastegate valve to decrease the amount of energy of the exhaust gas, which is used for rotating the turbine.

16. The exhaust gas control method according to claim 15, further comprising:

deciding an amount of fuel injected by the after-injection based on a temperature at which the catalyst is activated, and

increasing the at least one of the opening amount of the variable nozzle provided in the supercharger and the opening amount of the wastegate valve as the amount of fuel injected by the after-injection increases.

17. The exhaust gas control method according to claim 14, further comprising:

detecting at least one of an amount of intake air flowing through an intake passage of the internal combustion engine via an intake air amount detector and detecting a pressure of the intake air in the intake passage of the internal combustion engine via an intake air pressure detector, and

decreasing the amount of energy of the exhaust gas, which is used for rotating the turbine, when a value detected by the intake air amount detector or the intake air pressure detector after the after-injection is performed is higher than a value detected by the intake air amount detector or the intake air pressure detector before the after-injection is performed.

18. An exhaust gas control apparatus for an internal combustion engine, comprising:

a catalyst which is provided in an exhaust passage of the internal combustion engine and which has an oxidizing ability;

a supercharger which includes a turbine that is provided in the exhaust passage at a position upstream of the catalyst and that is rotated by exhaust gas, and a compressor that is rotated in accordance with rotation of the turbine and that performs supercharging;

turbine rotation energy amount adjusting means for adjusting an amount of energy of the exhaust gas, which is used for rotating the turbine; and

after-injection performing means for performing after-injection for injecting fuel after main fuel injection in order to increase a temperature of the exhaust gas released from the internal combustion engine and flowing in the catalyst, wherein when a work amount of the compressor is increased due to the after-injection performed by the after-injection performing means, the turbine rotation energy amount adjusting means decreases the amount of energy taken from the exhaust gas for rotating the turbine in order to decrease the increase in the work amount due to the after injection to zero.

APPENDIX B - EVIDENCE APPENDIX

NONE

APPENDIX C - RELATED PROCEEDINGS APPENDIX

NONE